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10/562,072	12/21/2005	Michael Andrew Yuratich	MRKS/0142	3875

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EXAMINER	
COMLEY, ALEXANDER BRYANT	
ART UNIT	PAPER NUMBER
3746	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/562,072	YURATICH, MICHAEL ANDREW	
	Examiner	Art Unit	
	ALEXANDER B. COMLEY	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 February 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *39-52* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *39-52* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12/21/2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

FINAL REJECTION

Status of the Claims

1. Examiner acknowledges receipt of Applicant's amendments and arguments filed with the Office on February 2nd, 2011 in response to Non-Final Office Action mailed on August 4th, 2010. Per Applicant's response, Claims 1-38 have been cancelled. Claims 39-52 have been newly-added. Consequently, Claims 39-52 now remain for prosecution in the instant application and currently being examined. The Examiner has carefully considered each of Applicant's amendments and/or arguments, and they shall be addressed below.

Claim Rejections - 35 USC § 112

2. **Claim 38** was previously rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant's cancellation of Claim 38 obviates this rejection, and therefore, the rejection has been withdrawn.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. **Claims 39-52** rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 5,844,397 to Konecny et al.

In regards to Independent **Claim 39**, Konecny et al. discloses an improved downhole pumping system that employs a variable speed PWM (pulse-width modulated) inverter and transformer setup in order to smoothly drive an induction (i.e. three-phase) motor over a range of different speeds (i.e. speed control means) (See Col. 1, Lines 12-18) More specifically, Konecny discloses variable voltage supply means for supplying a voltage that can be varied as required by stating "The invention receives electrical power from a three phase power supply 602 (FIG. 6). Preferably, the power supply 602 provides an A.C. voltage waveform of about 380 or 480 A.C. volts (RMS), with a frequency of 50-60 Hz. The power supply 602 is electrically connected to a three phase full-wave rectifier 604, which receives the waveform provided by the power supply 602 and converts it into D.C. voltage. The rectifier 604 provides a D.C. voltage of about 537 or 680 volts, depending upon whether the voltage of the power supply 602 is 380 or 480 A.C. volts, respectively." (Col. 4, lines 58-68) Applicant does not claim what the voltage must be varied upon, and as such, Konecny's varying of the voltage based on input AC voltage meets the claimed limitation. Konecny also discloses the use of a PWM inverter drive module 608 for producing modulated cyclic waveforms that switch between upper and lower voltage levels. In particular, Konecny states, "One approach that is used to develop rectangular voltage signals for PWM drives is the "sine-triangle" scheme. As shown in FIG. 3, this method designates high and low periods of a rectangular voltage signal 300 based upon the intersection between a triangular wave 302 having the desired chopping frequency (f.sub.PWM), and a sinusoidal signal 304 having the desired electrical driving frequency of the motor

(f.sub..omega.). The rectangular signal 300 is (1) high when the sinusoidal signal 304 is greater than the triangular wave 302, and (2) low when the sinusoidal signal 304 is less than the triangular wave 302." (Col. 2, Lines 24-34) Controller 612, power supply 614, and operator interface 616 (see Figure 6) collectively form a drive means for operating the inverter means to generate said cyclically varying waveforms (see col. 5, lines 4-33). With reference to figures 3-4, Konecny shows extended periods (300, 400) of substantially continuous voltage at each of the maximum and minimum voltage levels of the cyclic sinusoidal signal (302, 404). It is apparent from these figures that the sinusoidal signal is non-linear for both control methods (i.e. Figures 3 and 4), and furthermore, these non-linear sinusoidal signals non-linearly modulate the rectangular voltage levels in order to control the PWM supplied to the motor (i.e. speed control is directly regulated). Konecny even discloses the known use of uneven, non-symmetrical (i.e. over-modulated) sinusoidal signals for driving electric motors (see col. 3, lines 1-21) Hence, Figures 3 and 4 appear to show known PWM systems that transition between high and low voltage levels utilizing non-linear modulation techniques (i.e. sinusoidal signals). Moreover, it is clear that the PWM drive circuit utilizes high and low voltage levels for different periods of time in order to drive the motor at different speeds. Thus, Konecny's system utilizes a variable speed, variable voltage inverter drive system for downhole submersible pumps in which the voltage signals that are input to the inverter (i.e. PWM generator) can accurately and efficiently drive the pump.

5. In regards to dependent **Claims 40 & 46**, Konecny's three-phase power supply

602 drives all phases (3 phases) of the motor simultaneously (See Col. 2, Lines 13-34) Furthermore, the transformer of Konecny's drive circuit acts as a poly-phase boost converter (i.e. step-up converter). In particular, Konecny states "Typically, the variable speed drive and a drive controller of a selected type are operatively connected between the power line and a transformer. The transformer is utilized to drive the motor, and more particularly to step up the level of voltage and reduce the current supplied to the motor. This is especially important in applications such as downhole pumping operations, where a long cable connects the transformer to the motor; in these situations, the transformer helps prevent excessive current from flowing in the long cable." (Col. 1, Lines 53-61) In regards to dependent **Claim 41**, Konecny discloses a unique start-up routine (i.e. low motor speed) for linearly ramping up the current supplied to the motor to preset values of current (see col. 3, lines 55-62). In regards to dependent **Claims 42-43 & 47**, Konecny's invention is specifically aimed at providing a pulse-width-modulated time-dependent sequence in order to smooth out the voltage transitions through a range of different motor speeds (i.e. high speeds). (See Col. 2, Lines 13-34; Col. 3, Lines 42-51; Col. 4, Line 58- Col. 5, Line 8; Abstract) Konecny also specifically states that the frequency of the variable voltage source is varied with the output of a chopping mechanism (See Abstract; col. 2, lines 25-35; col. 3, line 63 – col. 4, line 8) In regards to dependent **Claims 44-45**, and with particular reference to Figure 7A-1, Konecny discloses the use of two capacitors (706, 708) connected to first and second supply voltage sources (701, 702), and selections means (705) designed to selectively vary the voltage (based on the duty cycle) supplied by the buses (701, 702)

(See Col. 5, Lines 44-67) Regarding dependent **Claim 48**, Konecny specifically discloses a transformer with first and second windings (See Col. 6, Lines 35-57). In regards to dependent **Claim 49**, Konecny clearly discloses the use of a filter in Figures 6-7 (Also see Col. 5, Lines 33-56) In regards to dependent **Claim 50**, Konecny specifically discloses the use of filter means adapted to supply sinusoidal voltage signals (see col. 5, lines 44-67) Regarding dependent **Claims 51-52**, it is apparent from previous disclosures that Konecny varies the input power (i.e. voltage) to the motor in order to match a desired speed based on required pumping capacity (i.e. load). The inverter 608 and controller 612 (i.e. means for controlling output power) monitor/control the amplitude and frequency of the control signals (i.e. output power) needed in the circuit and thereby supply the required phase/voltage/current (i.e. minimum allowable power) to the motor (see col. 5, lines 3-33) Konecny even goes on to describe the drive routine of the motor, and how it calculates the required driving frequency of the motor (i.e. minimum/maximum power or speed) in order to obtain a desired pump operation (i.e. user-defined speed) (See col. 8, line 20 - col. 9, line 26) As such, Konecny's drive system monitors the control circuitry in order to provide maximum pump output with minimal power consumption/waste.

Response to Arguments

6. Applicant's arguments filed February 3rd, 2011 have been fully considered but they are not persuasive. The Examiner's responses can be seen below.

7. In regards to Applicant's arguments that the drive system of Konecny does not teach the use of non-linear control techniques for controlling the motor voltage, waveforms, and speed, the Examiner must respectfully disagree. As stated previously above, Controller 612, power supply 614, and operator interface 616 (see Figure 6) collectively form a drive means for operating the inverter means to generate said cyclically varying waveforms (see col. 5, lines 4-33). With reference to figures 3-4, Konecny shows extended periods (300, 400) of substantially continuous voltage at each of the maximum and minimum voltage levels of the cyclic sinusoidal signal (302, 404). It is apparent from these figures that the sinusoidal signal is non-linear for both control methods (i.e. Figures 3 and 4), and furthermore, these non-linear sinusoidal signals directly modulate (i.e. non-linearly) the rectangular voltage levels in order to control the PWM supplied to the motor (i.e. speed control is directly regulated). Konecny even discloses the known use of uneven, non-symmetrical (i.e. over-modulated) sinusoidal signals for driving electric motors (see col. 3, lines 1-21) Hence, Figures 3 and 4 appear to show known PWM systems that transition between high and low voltage levels utilizing non-linear modulation techniques (i.e. sinusoidal signals). As such, the Examiner must assert that Konecny's system does, in fact, utilize non-linear (i.e. over-modulated) sinusoidal control signals for controlling the speed of the motor.

8. In regards to Applicant's argument that the voltage source for the control circuit of Konecny is not a variable voltage source, the Examiner must respectfully disagree. Konecny discloses variable voltage supply means for supplying a voltage that can be

varied as required by stating "The invention receives electrical power from a three phase power supply 602 (FIG. 6). Preferably, the power supply 602 provides an A.C. voltage waveform of about 380 or 480 A.C. volts (RMS), with a frequency of 50-60 Hz. The power supply 602 is electrically connected to a three phase full-wave rectifier 604, which receives the waveform provided by the power supply 602 and converts it into D.C. voltage. The rectifier 604 provides a D.C. voltage of about 537 or 680 volts, depending upon whether the voltage of the power supply 602 is 380 or 480 A.C. volts, respectively." (Col. 4, lines 58-68) The Examiner must assert that Applicant does not claim what the voltage must be varied upon, and as such, Konecny's varying of the voltage based on input AC voltage meets the claimed limitation.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEXANDER B. COMLEY whose telephone number is (571)270-3772. The examiner can normally be reached on M-F 7:30am - 5:00am EST (Alternate Fridays Off). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon C. Kramer can be reached on (571)-272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Alexander B Comley/
Examiner, Art Unit 3746

/William H. Rodríguez/
Primary Examiner, Art Unit 3741

ABC